A Natural Weapon for Preventing Malaria in the Peruvian Amazon

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[Photo: The bacteria, *Bacillus thuringiensis*, can be grown using coconuts or yucca plants.]

In the malaria-ridden Peruvian Amazon, researchers and local health officials have developed a new method of combatting the deadly disease using the yucca plant to produce a cheap and simple alternative to pesticides.

The bacteria Bti (*Bacillus thuringiensis var. israelensis* H-14) has long been recognized as a natural method of killing mosquito larvae without harming other life forms. The costs of producing the bacteria, however, are too high for a developing nation like Peru. Undeterred, researchers from Lima's Instituto de Medicina Tropical Alexander von Humboldt (IMT AvH), at the Universidad Peruana Cayetano Heredia (UPCH), led by microbiologist Palmira Ventosilla, have developed a 'natural laboratory' for producing Bti.

Yucca tea

Their method involves growing Bti using the 'tea' from boiled yucca plants, which is then applied to malaria-breeding ponds to kill mosquito larvae. This process originated from a successful seven-year pilot project using coconuts to ferment Bti in Salitral, a community in Peru's northern coastal region. The project ended in 1998, but the community continues to use the method with minimum supervision from the IMT AvH team.

"This was the first project of its kind where [a Peruvian] community was directly involved in producing a mosquito larvicide for malaria prevention," says Ms. Ventosilla, who spent years developing a multi-disciplinary method to transfer the process to local communities with funds from the International Development Research Centre (IDRC), the Canadian embassy, and the Pan American Health Organization (PAHO).

Positive evaluation

An evaluation of the project was positive. A survey of 50 school children involved in the initiative found that all of them knew the effects of Bti action, and 54 % correctly identified the malaria transmission cycle. Moreover, 89 % of all participants said they would like to participate in a

malaria prevention brigade. The only hitch was obtaining funding to continue and disseminate the project. After a lengthy campaign, the regional Ministry of Health authorities in Loreto, an Amazon Department, agreed to support an extension of the project.

Phase one, conducted in 1999, involved adapting the Bti method to the jungle climate and culture. The locally abundant and inexpensive yucca plant replaced the coconut, and three pilot communities near Iquitos, the regional capital, were chosen. Funds were acquired from the US-based non-governmental organization, Rivers of the World (ROW), for a laboratory, and health department officials in Loreto were taught the yucca method. With guidance from Ventosilla's team, health officials are now preparing for the first applications, which are planned to begin in February 2001.

Breeding grounds

"The jungle is another world — a sea of breeding grounds [for the mosquito]," says Ventosilla. "There are areas where the Ministry of Health has never gone in to map out the breeding grounds. We're discovering so many new things in this project — it's fascinating."

The final and most difficult step, she says, will involve transferring the process of producing and applying Bti to local communities. As in the Salitral project, Ventosilla plans to include anthropologists, sociologists, educators, and community members.

Working with communities

"The idea is to improve the process by working with communities," explains Ventosilla, who adds that in Salitral, community members helped adapt the process to their needs and contributed to the development of educational materials.

In the future, ROW hopes to secure funding for a boat laboratory that would travel the Amazon, applying the Bti bio-insecticide in isolated areas and providing medicine and treatment for malaria victims. Malaria is on the rise in Peru and poses serious problems for public health. In 1999, the Ministry of Health reported over 140,000 malaria cases, and medical professionals say that many more cases go unreported.

Technology transfer

Faced with this grave situation, Ventosilla's team is working to adapt the project to other areas in Peru, and the visionary biologist would ultimately like the procedure to spread across borders. Toward this end, she has already trained a team of Mexican scientists and ROW has expressed interest in transferring the technology to Africa where many countries still use DDT (which has been banned in North America and Europe) to combat malaria-carrying mosquitoes.

Ventosilla points out that since the early 1970s, mosquitoes have been developing resistance to pesticides, including DDT. She says the Bti method, combined with preventive measures — such as mosquito nets and paving irrigation channels — provides an effective alternative to toxic chemicals.

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If you have any comments about this article, please contact info@idrc.ca .

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